PATENT SPECIFICATION

Application Date: July 17, 1924. No. 17,104/24. **239,014**

Complete Left: Dec. 11, 1924.

Complete Accepted: Sept. 3, 1925.

PROVISIONAL SPECIFICATION.

Improvements in and relating to the Construction of Roads and like Surfaces.

We, GEORGE EDWARD CROWTER, of Oxted House, Oxted, Surrey, and JOHN HINES, of Flat 3, 92, Marina, St. Leonards on Sea, both British subjects, do hereby declare the nature of this invention to be as follows:—

This invention comprises improvements in and relating to the construction of roads and like surfaces, and has more particularly for its object to provide a more effective construction of metal bound, or metal keyed, road surface than has hitherto been known.

The special object in view is to provide a metal surface wearing coat with intervening spaces to be filled with concrete, cement, bitumen, asphalt, or any other suitable mixture or material, wherein the iron takes the wear and weight of traffic and the intervening spaces prevent slipperyness.

Various forms of skeleton metal reinforcement have been employed in, or proposed for, concrete and even tarmacadam roads, but such reinforcement generally takes the form of light latticing, or separated rods, or bars, with light wire ties, and is used mainly to prevent cracking in concrete roads under changing climatic conditions, and it has not been effective in preventing the undulations or waves which develop in the wearing surface of the road under heavy traffic. In fact there does not appear to have been any previous serious attempt made to use metal in the manner specified either to act as a wearing surface or to reinforce a wearing surface or to prevent undulations or corrugations developing in a wearing surface.

Accordingly, our invention consists in the use of skeleton "bricks" or strutted frames, or lengths of cast or wrought iron, or any metal, preferably cast iron, which can be embodied or set in or on cement, concrete, asphalt, bitumen or any road foundations and filled with cement, or fine aggregate bound by bituminous or asphaltic or tarred materials, or other suitable material.

The shape of the frames may vary as desired, for example they may be of oblong, hexagonal, round, or like form. Also they may take the form of an iron lattice work of flat, round, or any shaped bars, rivetted together with intervening spaces, or cast cellular or grid like plates.

In the case of a wrought lattice-work it is preferred to rivet the parts loosely which enables the reinforcement or lattice-work to lie on the road foundation surfaces and conform with the shape of the road.

The preferred form is a skeleton "brick" or oblong hollow frame with X, cross or other shaped internal strutting running from the corners, sides or ends which provides a rigid structure of great strength even when of light section metal.

The shape of the cross section of the bars of the "brick" or frame is tapered, undercut or bevelled, that is to say the superficial area of the flat surface on one side is greater or less than the opposite side, the object of this being to "key" the surface mixture and prevent the effect of wheeled traffic drawing or sucking the surface material out of the brick or reinforcement, or conversely, where the "brick" forms the wearing surface to prevent it being drawn up or sucked from the foundation of the road.

Such bricks or frames are convenient for handling, transporting, and laying, and when embodied in cement or bituminous material in a road surface; or to key a carpet to a foundation or under layer, will form a very durable,

[Price 1/-]

non-waving or non-corrugating road, also they may facilitate repair as openings may be easily made without damaging the bricks or frames.

It will be understood that we are not restricted to any particular method of embodying the " bricks " or frames in the material of the road, as the methods of use may vary considerably according to the nature of the materials used, but as one example of a satisfactory method we give the following.

In this example the road may be built of concrete, with ordinary lacing reinforcement if desired, and we put a thin coat of cement or asphalt or bituminous cement over this road and place the metal " bricks " or " frames " into the cement coat, either close together, or, preferably with intervening spaces according to the amount of traffic the road has to carry. After setting of the cement the road surface may be heated by a portable hot air machine, such as set forth in Specification No. 233,056, to remove all moisture from the concrete without displacing the bricks and the bricks are filled or grouted in and covered with an asphalt or other bituminous coat consolidated with a light roller.

The bricks or frames will be cast or formed with rough surfaces, or with cogs or projections on the surfaces to " key " them effectively in the foundation and the wearing carpet of the road.

It may be possible with the bricks or frames in use to reduce the thickness of the wearing surface of the road and so reduce cost whilst giving an unbreakable road.

Dated this 16th day of July, 1924.

For the Applicants,
GEORGE BARKER & BRETTELL,
Chartered Patent Agents,
75 & 77, Colmore Row, Birmingham.

COMPLETE SPECIFICATION.

Improvements in and relating to the Construction of Roads and like Surfaces.

We, GEORGE EDWARD CROWTER, of Oxted House, Oxted, Surrey, and JOHN HINES, of Flat 3, 92, Marina, St. Leonards on Sea, both British subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention comprises improvements in and relating to the construction of roads and like surfaces, and has more particularly for its object to provide a more effective construction of metal bound, or metal keyed, road surface than has hitherto been known.

Various forms of skeleton metal reinforcement have been employed in, or proposed for, concrete and even tarmacadam roads, such reinforcement generally taking the form of light latticing or framing, or separated rods, or bars, with light wire ties, and is used mainly to prevent cracking in concrete roads under changing climatic conditions. Frames of ferro-concrete are also known which are designed for incorporation in the road foundation, and are specially adapted for prevention of lateral spreading and longitudinal creeping of the body of the road material under strain of heavy traffic.

Among known methods of metal surface reinforcement may be mentioned light cast iron frames or elements spaced wholly apart from one another, so that displacement of one element will not affect other elements and individual expansion is allowed for. Heavy interlocking iron castings have also been used as a road foundation, the surface and interstices being filled with concrete or other material. These metallic elements or framings described have been in some cases secured to the foundation by means of rag-bolts.

Finally in order to ensure a good foothold for beasts of burden it is known to compose blocks to replace stone setts or the like in road facing, mainly of concrete or other earthy material, the blocks being faced with asphalt or like material and having a metal core consisting of an open rectangular framework, metal studs being provided at the intersections of the bars of the framework to stand above the plane of the asphalt facing, so as to provide a good foothold for horse and like traffic. Further, the individual blocks manufactured in this manner can be lifted or replaced without undue disturbance of the roadway.

The special object in view in the present invention is to provide a metal wearing coat, with intervening spaces to be filled with concrete, cement, bitumen, asphalt, or other suitable material, which shall be convenient for use in modern methods of road construction, which shall

be economical in manufacture, in which the metal reinforcement will take the strain of the traffic and being rigid will prevent corrugation and creeping of the surface and in which the dual nature of the surface will prevent slipperyness.

Our invention therefore consists in an improved method for the construction of roads and like surfaces, consisting in the incorporation with the material forming the wearing surface of skeleton metal bricks or frames formed of bars of tapered or bevelled cross-section, the frames being laid on any suitable foundation and filled with cement or fine aggregate bound with any suitable material. The frames are made from cast or wrought iron or any metal, preferably cast iron, and are adapted for embodiment or capable of being set in or on cement, concrete, asphalt, bitumen or any road foundations, and filled with cement or fine aggregate bound by bituminous, asphaltic, tarred or other suitable material.

The shape of the frames may vary in any desired manner, the bars of tapered or bevelled cross-section being rivetted together to take up any form of open lattice work, or the frames may be cast whole to suitable shape in the form of cellular or grid like plates, the bars being of similar cross-section.

One preferred form is a skeleton "brick" or oblong hollow frame with cross or other shaped internal strutting running from the corners, sides or ends which provides a rigid structure of great strength even when of light section metal.

The shape of the cross section of the bars of the "brick" or frame is tapered, undercut or bevelled, that is to say the superficial area of the flat surface on one side is greater or less than the opposite side, the object of this being to "key" the surface mixture and prevent the effect of wheeled traffic drawing or sucking the surface material out of the brick or reinforcement, or conversely, where the "brick" forms the wearing surface to prevent it being drawn up or sucked from the foundation of the road.

Further, the bricks or frames are preferably cast or formed with rough surfaces or with teeth or projections on one or both surfaces to key them effectively in the foundation and to the wearing surface of the road.

Such bricks or frames are convenient for handling, transporting, and laying, and when embodied in cement or bituminous material in a road surface, or when employed to key a carpet to a foundation or under layer, will form a very durable, non-waving or non-corrugating road; also they may facilitate repair as openings may be easily made without damaging the bricks or frames.

Also it may be possible with the bricks or frames in use to reduce the thickness of the wearing surface of the road and so reduce cost while giving an unbreakable road.

Some practical forms of brick or frame for use in carrying out our invention have been illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a plan of one form and,

Figure 2, is a section on the line 2—2 of Fig. 1.

Figure 3, is a plan of another form and

Figure 4, is a section on the line 4—4 of Fig. 3.

Figure 5, is a plan of a further form, and

Figure 6, is a section on the line 6—6 of Fig. 5.

Figure 7 is a plan of another form,

Fig. 8 is a section on the line 8—8 of Fig. 7 and

Figure 9 is a fragmentary side elevation.

The brick or frame illustrated in Figs. 1 and 2 consist of a rectangular skeleton frame *a* which may conveniently be of cast iron. Each of the bars forming the frame is tapered in cross section, being narrower on one face than the other, and both surfaces of the bars are formed with transverse grooves or corrugations *b*. As an additional means for keying the frame to the road conical projections *c* may be provided on one surface at each corner as shown in dotted lines. Frames of this type may be arranged either close together or with intervening spaces according to the amount of traffic the road has to carry.

In the form illustrated in Figs. 3 and 4 each brick or frame consists of a casting in the form of bars *d* tapered in cross-section as shown in Fig. 4 and crossing each other at right angles to leave square or rectangular spaces between the bars. The junction of each pair of bars is of heavier section and the metal at this point projects above and below the plane of the bars to provide a square stud *e* projecting above the bars and a tapered stud *f* below the bars to key the frame to the foundation of the road. The upper surfaces of the bars and the studs are formed with transverse ribs or corrugations as before, and the frames are adapted to be assembled with the ends of the bars *d* in adjacent frames abutting so that a

cellular reinforcement is provided over the whole surface of the road.

One method of incorporating the frames in a road surface has been illustrated in Fig. 4. The frame is placed in position upon the concrete or other road foundation *g* with the studs *f* entering into the foundation to key the frame thereto. After the frames have been placed in position the road surface may be heated by a portable hot-air machine of known type to remove all moisture from the foundation without disturbing the frames, and the frames are filled or grouted in and covered with an asphalt or other bituminous layer *h* consolidated with a light roller. The surface level of the bituminous layer would in this case be flush with the upper surface of the studs *e* as shown in the drawings.

Another convenient form of brick or frame is illustrated in Figs. 5 and 6, consisting of a rectangular skeleton *j* with internal bracing members *k* of tapered cross-section as shown in Fig. 6. Tapered downwardly projecting studs *h* as shown in dotted lines may if desired be provided at each corner of the frame.

Another convenient form is a square frame similar to the upper part of the frame illustrated in Fig. 5, or a frame of hexagonal or octagonal outline with similar internal bracing.

A further form of frame is illustrated in Figs. 7, 8 and 9, consisting of a pair of bars *l* meeting at an angle. The bars are tapered in cross-section as shown and are formed with transverse ribs or corrugations *m* on both upper and lower faces.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An improved method for the construction of roads and like surfaces, consisting in the incorporation with the material forming the wearing surface of skeleton metal bricks or frames formed of bars of tapered or bevelled cross-section, the frames being laid on any suitable foundation and filled with cement or fine aggregate bound with any suitable material.

2. An improved method for the construction of roads and like surfaces consisting in the incorporation with the material forming the wearing surface of skeleton metal bricks or frames formed of bars of tapered or bevelled cross-section and having projections whereby they are keyed to a suitable foundation in or upon which they are set.

3. An improved skeleton metal brick or strutted frame for use in carrying out the method set forth in Claim 1 or Claim 2, comprising a skeleton frame formed of bars of tapered or bevelled cross-section, the superficial area of the flat surface of the bars on one side being greater than that of the other side.

4. An improved skeleton metal brick or strutted frame for use in carrying out the method set forth in Claim 1 or Claim 2, comprising a skeleton frame of bars having ribs or corrugations formed on their upper or lower surface or on both surfaces for the purposes described.

5. An improved skeleton metal brick or strutted frame for use in carrying out the method set forth in Claims 1 or 2 comprising a skeleton frame of bars of tapered or bevelled cross section, having spaced projections extending beyond the plane of the bars from the upper or lower surface of the bars or from both surfaces.

6. An improved skeleton metal brick or strutted frame, as claimed in Claim 3, 4 or 5, comprising a skeleton unit cast in one piece.

7. The improved skeleton metal bricks or strutted frames for carrying out the method claimed in Claim 1 or Claim 2, substantially as described and as illustrated in the drawings.

Dated this 4th day of December, 1924.

For the Applicants,
GEORGE BARKER & BRETTELL,
Chartered Patent Agents,
75 & 77, Colmore Row, Birmingham.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1925.

[This Drawing is a reproduction of the Original on a reduced scale]

FIG. 1

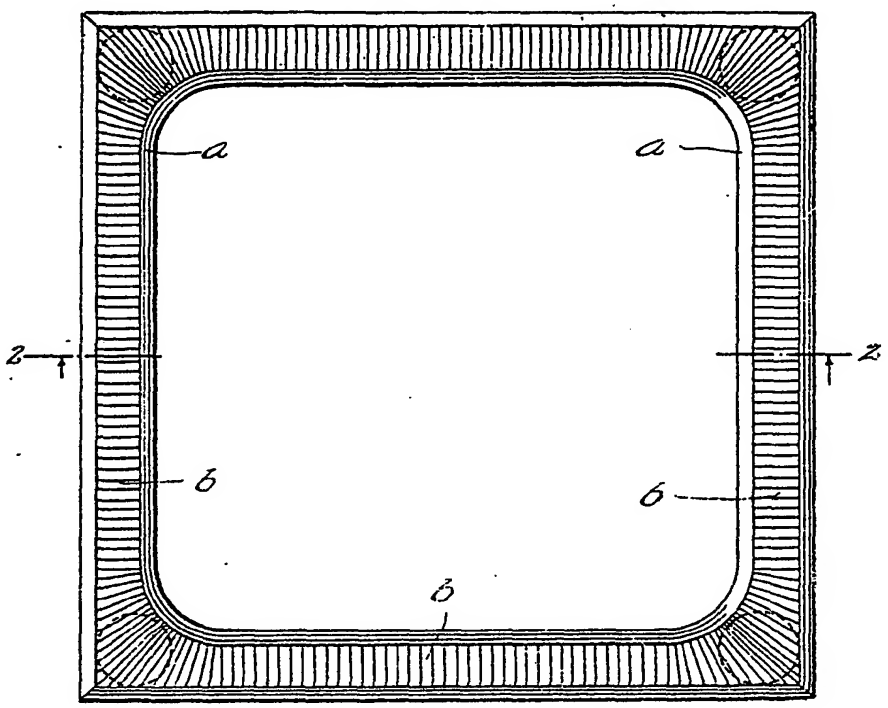

FIG. 2

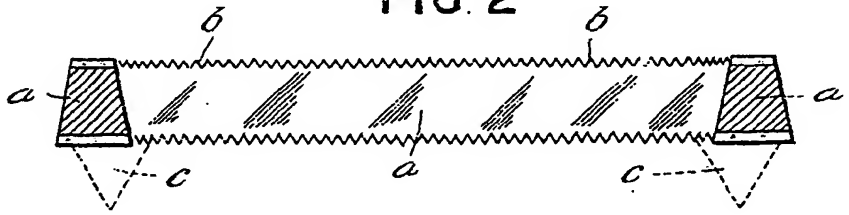

FIG. 4

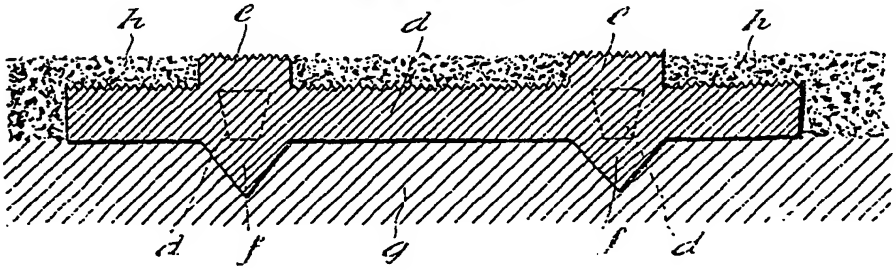

FIG. 3

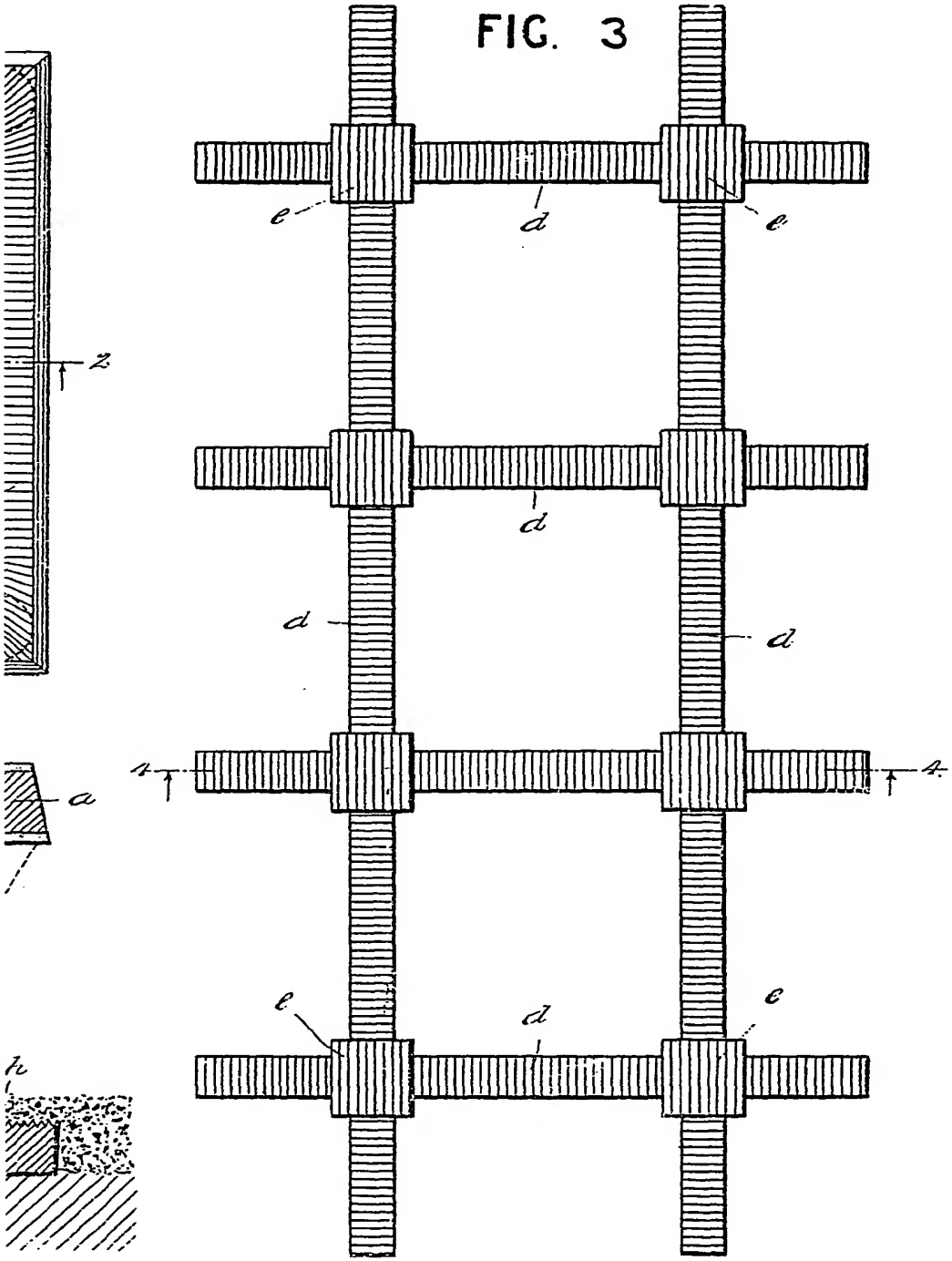

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FIG. 1

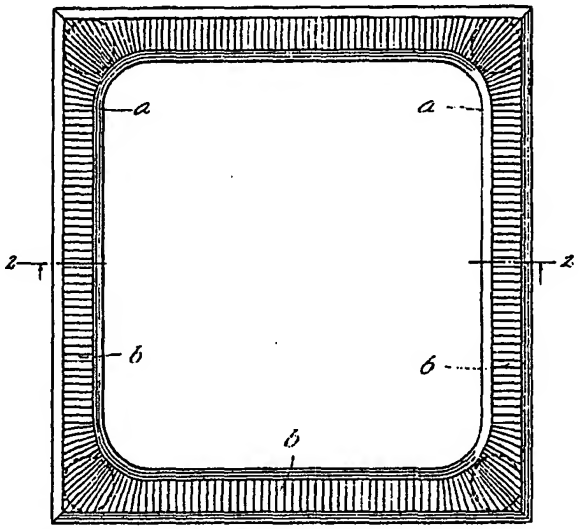


FIG. 2

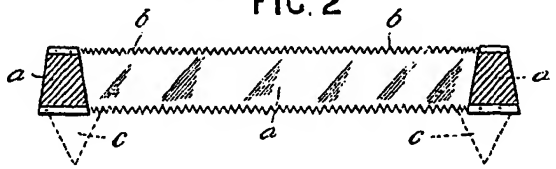


FIG. 3

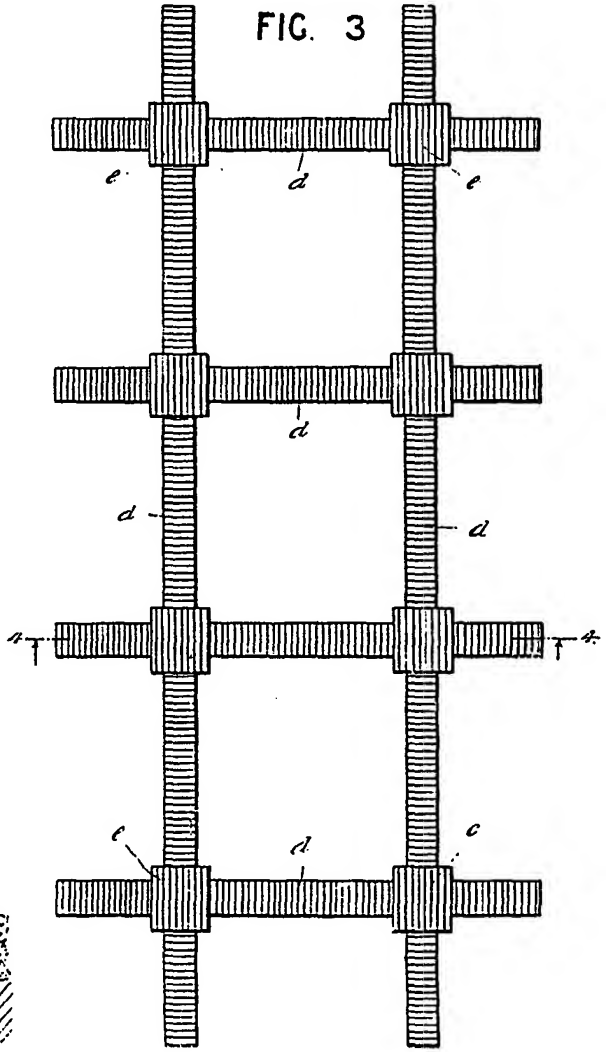
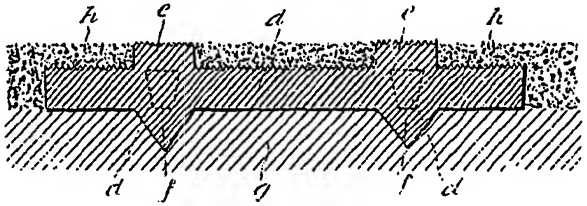


FIG. 4



SHEET 2

FIG 5

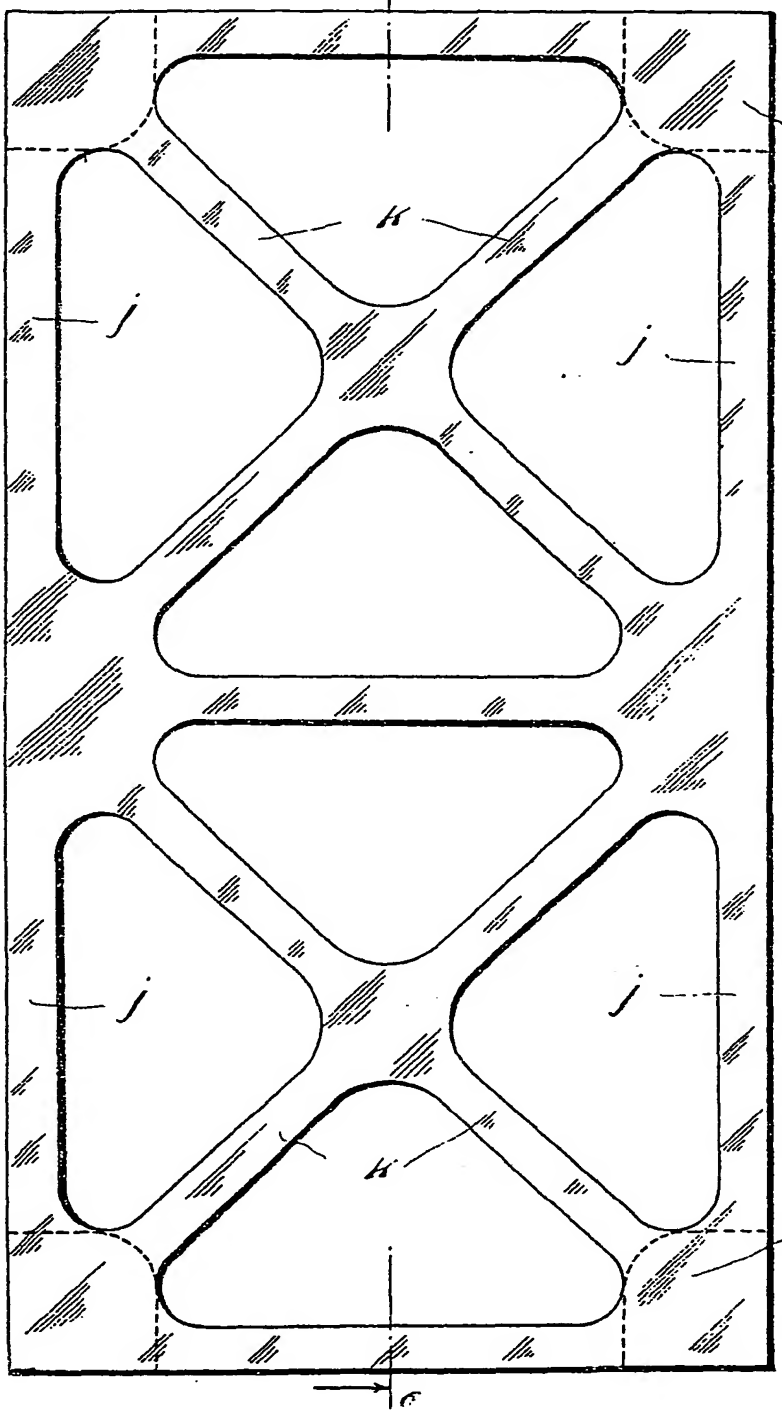


FIG. 6

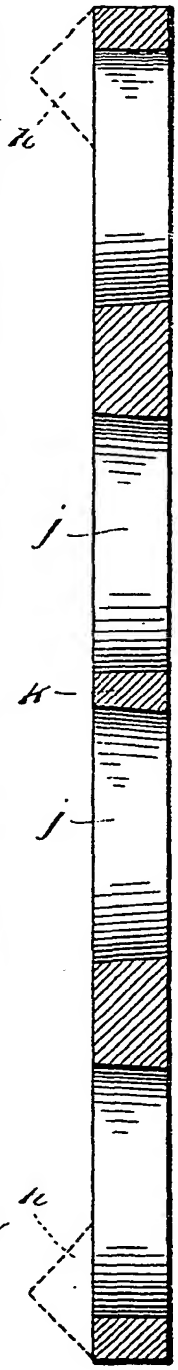


FIG 7

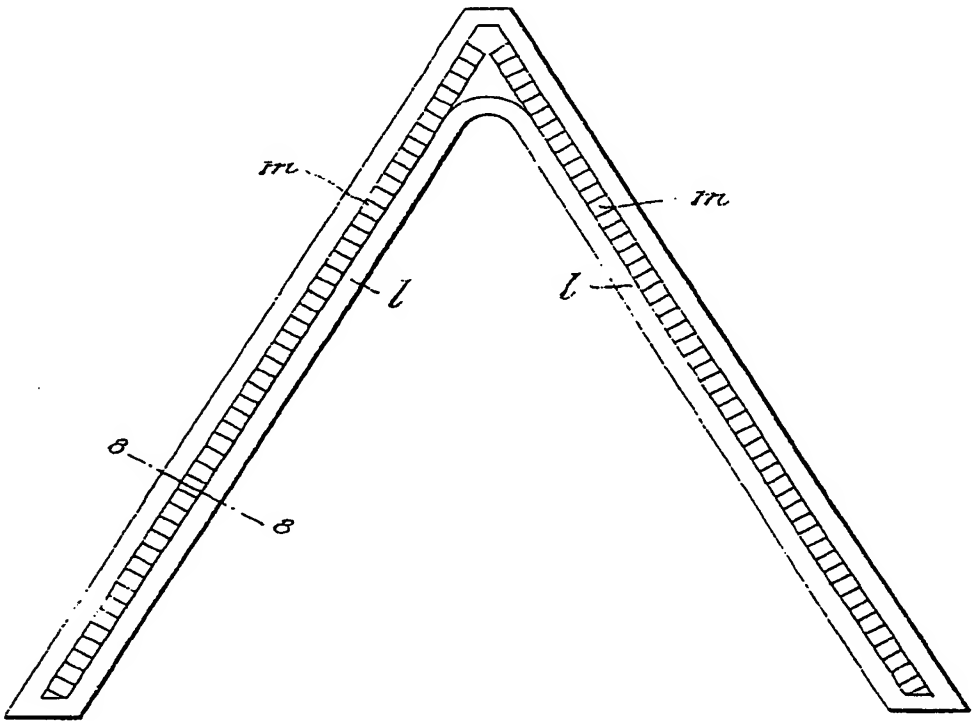


FIG. 8

FIG. 9

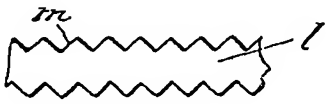


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FIG 5

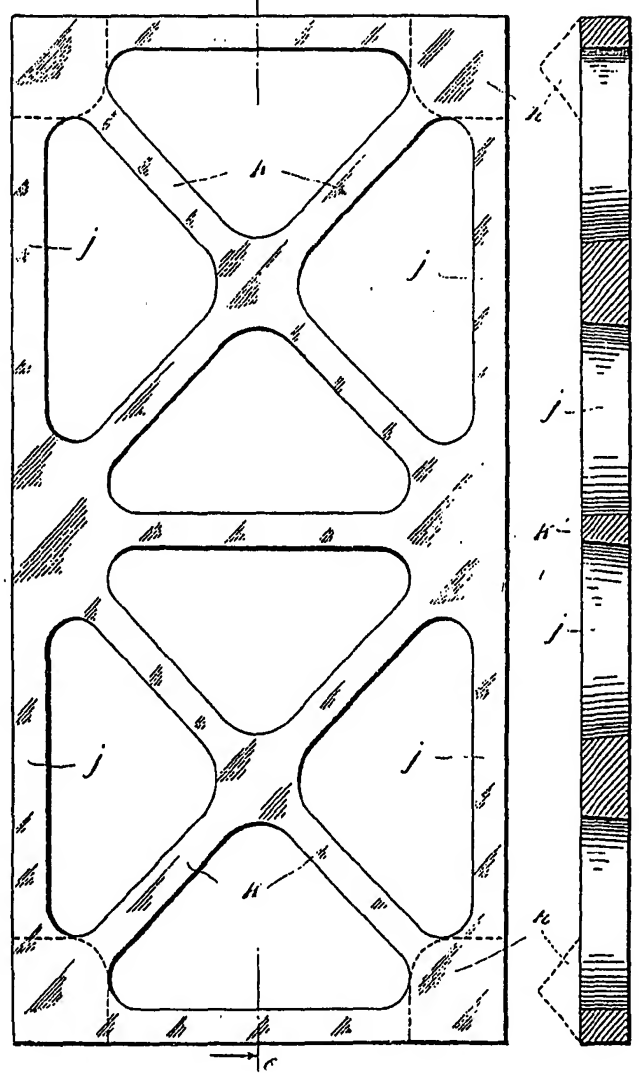


FIG 6

FIG 7

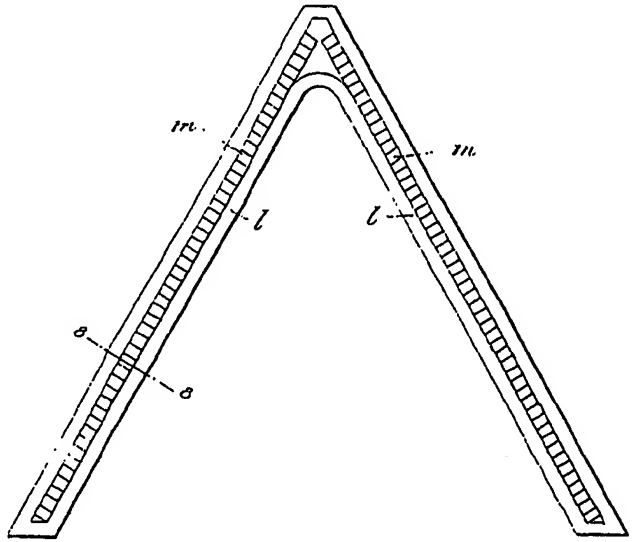
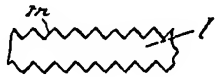


FIG. 8

FIG. 9



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